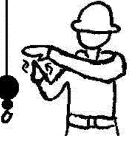




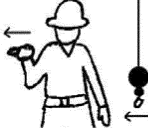
 <p><b>LOWER THE BOOM AND RAISE THE LOAD</b> – With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.</p>	 <p><b>MOVE SLOWLY</b> – A hand is placed in front of the hand that is giving the action signal.</p>	 <p><b>USE AUXILIARY HOIST</b> (whipline) – With arm bent at elbow and forearm vertical, elbow is tapped with other hand. Then regular signal is used to indicate desired action.</p>
 <p><b>CRAWLER CRANE TRAVEL, BOTH TRACKS</b> – Rotate fists around each other in front of body; direction of rotation away from body indicates travel forward; rotation towards body indicates travel backward.</p>	 <p><b>USE MAIN HOIST</b> – A hand taps on top of the head. Then regular signal is given to indicate desired action.</p>	 <p><b>CRAWLER CRANE TRAVEL, ONE TRACK</b> – Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel.</p>
 <p><b>TROLLEY TRAVEL</b> – With palm up, fingers closed and thumb pointing in direction of motion, hand is jerked horizontally in direction trolley is to travel.</p>		

**APPENDIX B TO SUBPART CC OF PART 1926—ASSEMBLY/DISASSEMBLY: SAMPLE PROCEDURES FOR MINIMIZING THE RISK OF UNINTENDED DANGEROUS BOOM MOVEMENT**

1. Section 1926.1404(f)(1) provides that when pins (or similar devices) are being removed, employees must not be under the boom, jib, or other components, except where the requirements of §1926.1404(f)(2) are met. The exception in §1926.1404(f)(2) applies when the employer demonstrates that site constraints require one or more employees to be under the boom, jib, or other components when pins (or similar devices) are being removed. In such a situation, the A/D director must

implement procedures that minimize the risk of unintended dangerous movement and minimize the duration and extent of exposure under the boom.

The following scenario is an example of how the exception applies: A boom cannot be disassembled on the ground because of aboveground piping (as might be found, for example, in an oil refinery) that precludes lowering the boom to the ground. The boom must therefore be disassembled in the air, and the employees who remove the pins must perform that work from an aerial lift whose base is positioned on one side (the near side) of the boom. To gain access to the pins on the far side, the aerial lift basket must move under the boom, since, due to lack of room,

the aerial lift cannot be repositioned on the far side. Due to lack of room, the aerial lift cannot be repositioned on the far side, so the aerial basket must move under the boom to gain access to the pins on the far side.

To minimize the risk of unintended dangerous movement while the pins are removed, the A/D director uses an assist crane that is rigged to support the boom section that is being detached, using particular care to ensure that the section end that is near the employee(s) removing the pins is well supported. The duration and extent of exposure is minimized by removing the far side pins first, moving the aerial lift basket as soon as possible to the near side so that the employees are no longer under the boom, and then removing the near side pins.

2. Section 1926.1404(h)(6)(i) provides that, during assembly/disassembly, the center of gravity of the load must be identified if that is necessary for the method used for maintaining stability. Section 1926.1404(h)(6)(ii) states that, where there is insufficient information to accurately identify the center of gravity, measures designed to prevent unintended dangerous movement resulting from an inaccurate identification of the center of gravity must be used.

An example of the application of §1926.1404(h)(6)(ii) is as follows: The boom is assembled by lowering boom sections sequentially into place using an assist crane. The A/D director's plan is to keep the boom sections stable while they are lowered into place by attaching the assist crane hoist line above the center of gravity of each section. However, in assembling the non-symmetrical top section of the boom, the A/D director is not able to determine where to attach the assist crane hoist line so that it is above the center of gravity. In this situation, before raising the section, all personnel are kept clear of the section and the section is first raised a few inches to determine whether it tips when raised (if it did tip, it would indicate it is not rigged over the center of gravity). If this occurs, the hoist line is repositioned and the procedure repeated (with employees kept clear of the section while it is raised) until the A/D director determines that it is rigged over the center of gravity and can be moved into place without dangerous movement.

#### APPENDIX C TO SUBPART CC OF PART 1926—OPERATOR CERTIFICATION: WRITTEN EXAMINATION: TECHNICAL KNOWLEDGE CRITERIA

This appendix contains information for employers, accredited testing organizations, auditors and government entities developing criteria for a written examination to test an individual's technical knowledge relating to the operation of cranes.

(a) General technical information.

(1) The functions and limitations of the crane and attachments.

(2) Wire rope:

(i) Background information necessary to understand the inspection and removal from service criteria in §1926.1413 and §1926.1414.

(ii) Capacity and when multi-part rope is needed.

(iii) Relationship between line pull and safe working load.

(iv) How to determine the manufacturer's recommended rope for the crane.

(3) Rigging devices and their use, such as:

(i) Slings.

(ii) Spreaders.

(iii) Lifting beams.

(iv) Wire rope fittings, such as clips, shackles and wedge sockets.

(v) Saddles (softeners).

(vi) Clamps (beams).

(4) The technical limitations of protective measures against electrical hazards:

(i) Grounding.

(ii) Proximity warning devices.

(iii) Insulated links.

(iv) Boom cages.

(v) Proximity to electric power lines, radii, and microwave structures.

(5) The effects of load share and load transfer in multi-crane lifts.

(6) Basic crane terms.

(7) The basics of machine power flow systems.

(i) Mechanical.

(ii) Electrical.

(iii) Pneumatic.

(iv) Hydraulic.

(v) Combination.

(8) The significance of the instruments and gauge readings.

(9) The effects of thermal expansion and contraction in hydraulic cylinders.

(10) Background information necessary to understand the requirements of pre-operation and inspection.

(11) How to use the safety devices and operational aids required under §1926.1415 and §1926.1416.

(12) The difference between duty-cycle and lifting operations.

(13) How to calculate net capacity for every possible configuration of the equipment using the manufacturer's load chart.

(14) How to use manufacturer-approved attachments and their effect on the equipment.

(15) How to obtain dimensions, weight, and center of gravity of the load.

(16) The effects of dynamic loading from:

(i) Wind.

(ii) Stopping and starting.

(iii) Impact loading.

(iv) Moving with the load.

(17) The effect of side loading.

(18) The principles of backward stability.

(b) Site information.